United States Environmental Protection Agency

Environmental Technology Verification Program

October 2003

QUARTERLY REPORT

Water Quality Protection Center Verifies Technologies for Residential Nutrient Reduction

Domestic wastewater contains a number of physical, chemical, and bacteriological constituents, which require treatment prior to release into the environment. Various wastewater treatment processes exist which provide for the reduction of oxygen-demanding materials, suspended solids, and pathogenic organisms.

The reduction of nutrients in domestic wastewater discharged from single-family homes, small businesses, and similar locations within watersheds is important for several reasons. First, reduction of watershed nitrogen inputs helps meet drinking water quality standards for nitrate and nitrite; and second, the reduction of both nitrogen and phosphorous helps protect the water quality of receiving surface and ground waters from eutrophication and the consequent loss in ecological, commercial, recreational, and aesthetic uses for these waters.

The ETV Water Quality Protection Center, operated in cooperation with NSF International, has verified the performance of five on-site residential nutrient reduction systems designed to reduce nitrogen in domestic wastewater from individual residential homes. The five systems are: Bioclere Model 16/12 by Aquapoint, Inc.; Waterloo Biofilter Model 4-Bedroom by Waterloo Biofilter Systems, Inc.; SeptiTech Model 400 System by SeptiTech, Inc.; Amphidrome Model Single Family System by F.R. Mahony & Associates; and RetroFAST 0.375 System by Bio-Microbics. The Bioclere, SeptiTech, and Waterloo systems are two-stage treatment technologies based on fixed film trickling filter biological systems for nitrogen removal for residential applications. The RetroFAST and Amphidrome systems are submerged growth biological filter treatment systems for nitrogen removal, also for residential applications.

Verification testing for the five technologies consisted of monthly sampling during a 12-month test period, and sampling during five sequences with varying stress conditions simulating real household conditions (washday, working parent, low loading, power failure, and vacation test). Monitoring for nitrogen reduction was accomplished by measurement of nitrogen species (TKN, NH_3, NO_2, NO_3). Biochemical oxygen demand and carbonaceous biochemical oxygen demand, as well as other basic parameters (i.e., pH, alkalinity, temperature, etc.), were monitored to provide information on overall system performance. Operational characteristics, such as electric use, residuals generation, labor to perform maintenance, maintenance tasks, durability of hardware, and noise and odor production, were also monitored.

Four of the systems were tested at the Massachusetts Alternative Septic System Test Center (MASSTC), located at Otis Air National Guard Base in Bourne, MA. Sanitary sewerage from the base residential housing was used for the testing. The RetroFAST system was tested at the Mamquam Wastewater Treatment Plant (WWTP), which serves the District of Squamish, British Columbia, Canada.

The verification reports and statements are available on the ETV Web Site at http://www.epa.gov/etv/verifications/vcenter9-3.html.

ETV

What's Inside

ETV Air Pollution Control Technology Center

- Completed testing of the Lubrizol Purifilter DPF for engine control systems
- Presented three papers on diesel engine test results for diesel oxidation catalysts, dust suppression results for unpaved roads, and bioreactor technology for controlling VOC emissions from industrial processes at the Air and Waste Management Association 96th Annual Conference and Exhibition in June
- Presented on APCT at the 2003 National Environmental Innovations Summit in July
- Completed testing of the Platinum Plus Fuel Borne Catalyst and CleanAIR Systems Diesel Oxidation Catalyst developed by Clean Diesel Technology, Inc.
- Presented at the Council of Industrial Boiler Owners, Industrial Emissions Conference in August
- Participated in the Department of Energy 9th Diesel Engine Emissions Reduction Workshop in August
- Completed a Verification Protocol for Bioreaction System Control Technologies for Volatile Organic Compound Emissions
- Completed a Verification Protocol for Determination of Emissions Reductions from Selective Catalytic Reduction Control Technologies for Highway, Nonroad, and Stationary Use Diesel Engines
- Completed a Verification Protocol for Determination of Emissions Reductions Obtained by Use of Alternative or Reformulated Liquid Fuels, Fuel Additives, Fuel Emulsions, and Lubricants for Highway and Nonroad Use Diesel Engines and Light Duty Gasoline Engines and Vehicles

ETV Drinking Water Systems Center

- Presented a poster at the EPA Science Forum 2003 in May
- Exhibited at the American Water Works Association Annual Conference and Exposition in June
- Completed testing of Separmatic Filter Company's Pressure Model 12P-2
- Published an article on DWS arsenic verifications in the NSF International Water Works newsletter
- Completed testing of the Kinetico Model AA08AS Para-Flo PF60 Backwashing Filter containing Alcan AAFS-50 Media
- Began testing of a point-of-use reverse osmosis filtration technology for microbiological agents developed by Watts Premier
- Completed revisions to the Protocol for Equipment Verification Testing for Arsenic Removal
- Completed revisions to the Protocol for Equipment Verification Testing for Removal of Precursors to Disinfection By-Products
- Completed revisions to the test plans for Coagulation and/or Co-Precipitation and Filtration for Removal of Arsenic and Adsorptive Media Processes for Removal of Arsenic
- Completed revisions to the test plan for Membrane Processes for the Removal of Precursors to Disinfection By-Products
- Presented at the Association of State Drinking Water Administrators 18th Annual Conference in October
- Began testing of the ADI International Media G2 Adsorption System
- Presented at the Council of Public Health Consultants Meeting in October
- Presented to the Drinking Water Treatment Units Certification Program Joint Committee and Industry Forum meetings in October

ETV Greenhouse Gas Technology Center

- Completed testing of the Capstone 60 kW MicroTurbine for combined heat and power at a commercial supermarket in Hauppage, NY
- Signed a commitment letter with Microganics, LLC. for verification of biological reactants to accelerate biogas production from digesters
- Completed testing of ConocoPhillips Fuel-Efficient High-Performance SAE 75W90 Rear Axle Gear Lubricant
- Presented a paper at the Anerobic Digester Technology Applications in Animal Agriculture National Summit in June
- Met with the North Carolina Energy Office in August to discuss collaborative efforts
- Signed a vendor commitment letter with Universal Cams for verification of the Universal Cams Diesel Engine Retrofit System

ETV Advanced Monitoring Systems Center

- Completed phase I testing of ammonia continuous emissions monitors (CEMs) at the American Electric Power Mountaineer coal-fired power plant in New Haven, WV
- Held a meeting of the Water Security Stakeholders Group in May
- Presented two posters at the EPA Science Forum 2003 in May
- Presented on mercury and ammonia CEM verifications to the Electric Power Research Institute CEM Users Group
- Completed the Test/QA Plan for Verification of Rapid Toxicity Technologies
- Completed testing of rapid, broad-spectrum toxicity screening methods relevant to homeland security
- Held a meeting in August with the EPA Office of Water (OW) to discuss how the center can provide verification information to the OW Alternate Test Procedure Program
- Held a meeting of the Air Stakeholder Group in September
- In partnership with the U.S. Department of Agriculture, held a technology field day for ambient ammonia sensors in September
- Signed vendor agreements for verification of immunoassay screening methods for biotoxins in water
- Completed phase I testing of ambient ammonia sensors at a hog farm in Ames, IA, and began phase II testing at a cattle farm in Bushland, TX
- Began round 2 testing of two multi-parameter water quality probes in cooperation with the National Oceanic and Atmospheric Administration Center for Coastal Environmental Health and Biomolecular Research at their harbor facility in Charleston, SC
- Completed Generic Verification Protocols for Portable Multigas Analyzers, Continuous Emission Monitors for Ammonia at a Power Production Facility, and Mercury Continuous Emission Monitors at a Full-Scale Waste Incinerator
- Held a technology field day to demonstrate three types of instruments applicable to homeland security in October
- Presented at the National Atmospheric Deposition Program Ammonia Workshop in October
- Held a meeting of the Water Security Stakeholder Group in October
- Completed testing of four immunoassay test kits for detecting and quantifying atrazine in water

ETV Water Quality Protection Center

- Presented at the 2003 American Water Resources Association Spring Specialty Conference on Agricultural Hydrology and Water Quality in May
- Presented a paper at the National Environmental Health Association 67th Annual Educational Conference in June
- Presented a paper at the International Association for Great Lakes Research 46th Annual Conference in June
- Presented at the International Maritime Organization 2nd International Ballast Water Treatment Research and Development Symposium in London, United Kingdom, in July
- Presented a paper at StormCon 2003 in July
- Signed a vendor agreement with Hoffland Environmental for verification of their agricultural waste treatment technology
- Held a meeting in August with the U.S. Coast Guard and members of a delegation from Singapore to discuss efforts related to ballast water technology verification
- Held a meeting of the Ballast Water Treatment Technologies Stakeholder Advisory Group in September
- Participated in the Water Environment Federation 76th Annual Technical Exhibition and Conference in October

ETV Building Decontamination Technology Center

- Signed vendor agreements with BIOQUELL, Inc., Certek Incorporated, and CDG Technology, Inc., for verification of three decontamination technologies for biological and chemical contamination of indoor surfaces
- Presented a paper at the Air and Waste Management Association/U.S. EPA Indoor Air Quality Problems and Engineering Solutions in July
- Began testing of a hydrogen peroxide decontamination technology developed by BIOQUELL, Inc.
- Held a technology field day to demonstrate three types of instruments applicable to homeland security in October

ETV Safe Buildings

Safe Buildings Monitoring and Detection

- Presented a poster at the EPA Science Forum 2003 in May
- Completed a test/QA plan for verification testing of ion mobility spectrometers
- Began verification testing the Bruker Daltonics RAID-M Ion Mobility Spectrometer
- Held a stakeholder group teleconference in September
- Held a technology field day to demonstrate three types of instruments applicable to homeland security in October

Safe Buildings Air Filtration and Cleaning

- Presented a paper at the Air and Waste Management Association/U.S. EPA Indoor Air Quality Problems and Engineering Solutions in July
- Completed a test/QA plan for testing of general ventilation air filters for safe buildings applications
- Began testing of 10 general ventilation air filters for safe buildings applications

ETV P2 Coatings and Coating Equipment Pilot

- Completed the ANEST IWATA Corporation LPH400-LV HVLP Spray Gun Testing and Quality Assurance Project Plan
- Completed testing of the ANEST IWATA Corporation LPH400-LV HVLP Spray Gun
- Participated in the Joint Services Pollution Prevention and Hazardous Waste Management Conference and Exhibition in August
- Presented at the 2003 Painting Technology Workshop (PTW2003) in October

241 Verified Technologies

Add-on NO_x Control Devices
- Catalytica Energy Systems, Inc.; Mountain View, CA

Aerosol Can Recycling Systems
- Katec, Inc.; Virginia Beach, VA

Air/Fuel Ratio Controllers
- MIRATECH Corporation; Tulsa, OK (2)

Ambient Fine Particulate Monitors
- Dekati Ltd.; Helsinki, Finland
- EcoChem Analytics; League City, TX
- Met One Instruments, Inc.; Grants Pass, OR
- Opsis AB; Furuland, Sweden
- Rupprecht & Patashnick, Co.; Albany, NY (5)
- Thermo Andersen; Smyrna, GA (3)
- TSI Incorporated; St. Paul, MN

Animal Waste Treatment - Solids Separation
- Triton Systems, LLC; Dearborn, MI

Aqueous Circuit Board Cleaners
- Smart Sonic Corporation; Van Nyes, CA

Aqueous Cleaner Maintenance Solution
- BioClean USA, LLC; Bridgeport, CT
- USFilter Corporation (Silverback); Billerica, MA

Arsenic Test Kits
- Envitop, Ltd.; Oulu, Finland
- Industrial Test Systems, Inc.; Rock Hills, SC (5)
- Monitoring Technologies International, Pty. Ltd.; Perth, Western Australia
- Peters Engineering; Graz, Austria
- TraceDetect; Seattle, WA

Baghouse Filtration Products
- BHA Group, Inc.; Kansas City, MO
- BWF America, Inc.; Florence, KY
- Polymer Group, Inc.; Moorseville, NC
- Tetratec PTFE Technologies; Feasterville, PA
- W.L. Gore & Associates, Inc.; Elkton, MD (2)

Chromate Conversion Coating Solution Maintenance
- USFilter Corporation; Billerica, MA

Computerized Ion Exchange Regeneration Processes
- Hydromatix Corporation; Sante Fe Springs, CA

Decision Support Software
- C Tech Development Corporation; Huntington Beach, CA
- Decision*FX*, Inc.; Bosque Farms, NM (2)
- Environmental Software; Huntington Beach, CA
- Environmental Systems Research Institute; Redlands, CA
- University of Tennessee Research Corporation; Knoxville, TN

Diesel Fuel Use Technologies
- JCH Fuel Solutions, Inc.; Las Vegas, NV

Drinking Water Backwashable Depth Filtration Technologies
- Kinetico, Inc.; Newbury, OH

Drinking Water Cartridge/Bag Filter Elements
- Lapoint Industries; Lewiston, ME
- Rosedale Products, Inc.; Ann Arbor, MI

Drinking Water Coagulation and Filtration Technologies for Arsenic Removal
- Kinetico, Inc.; Newbury, OH
- Watermark Technologies, LLC; Draper, UT

Drinking Water Enhanced Coagulation Technologies
- Kinetico, Inc.; Newbury, OH

Drinking Water Microfiltration Technologies
- Pall Corporation; East Hills, NY
- Pall Corporation; Port Washington, NY
- US Filter; Ames, IA

Drinking Water Nanofiltration Technologies
- PCI Membrane Systems, Inc.; Milford, OH

Drinking Water On-Site Halogen Generation Technologies
- ClorTec; Campbell, CA
- Exceltec International Corporation; Sugar Land, TX
- OXI Company, Inc.; Virginia Beach, VA

Drinking Water Ozone/Advanced Oxidation Technologies
- Osmonics, Inc.; Minnetonka, MN

Drinking Water Pentalodide Resin for Microbiological Inactivation
- PentaPure, Inc.; West St. Paul, MN

Drinking Water Reverse Osmosis Technologies for Arsenic Removal
- Hydranautics; Oceanside, CA
- Koch Membrane Systems; Wilmington, MA

Drinking Water Ultrafiltration Technologies
- Aquasource North America; Richmond, VA (2)
- F.B. Leopold Co., Inc.; Zelienople, PA
- Hydranautics; Oceanside, CA
- Ionics; Watertown, MA
- Polymem; Fourquevaux, France
- ZENON Environmental Systems, Inc.; Ontario, Canada (2)

Drinking Water Ultrafiltration with Enhanced Coagulation Technologies
- ZENON Environmental Systems, Inc.; Ontario, Canada

Drinking Water UV Radiation Technologies
- Atlantic Ultraviolet Corporation; Hauppauge, NY
- Calgon Carbon Corporation; Ontario, Canada
- Trojan Technologies, Inc.; Ontario, Canada

Emulsified Fuels
- A-55 Limited Partnership; Reno, NV

Fuel Cells
- International Fuel Cells Corporation; South Windsor, CT
- Plug Power; Latham, NY

Gas Chromatographs (Field Portable)
- Electronic Sensor Technology; Newbury Park, CA (2)
- Perkin-Elmer Corporation-Photovac Monitoring Instruments; Wilton, CT
- Sentex Systems, Inc.; Ridgefield, NJ
- SRI Instruments; Torrance, CA

Gas Chromatographs/Mass Spectrometers (Field Portable)
- Bruker-Franzen Analytical Systems, Inc.; Billerica, MA
- Bruker Daltonics, Inc. (formerly Viking Instruments Corp.); Billerica, MA
- Inficon, Inc.; East Syracuse, NY

Ground Water Sampling Devices
- Burge Environmental; Tempe, AZ
- Clean Environment Equipment; Oakland, CA
- GeoLog, Inc.; Medina, NY
- Geoprobe Systems, Inc.; Salina, KS (2)
- QED Environmental Systems, Inc.; Ann Arbor, MI
- Sibak Industries Ltd., Inc.; Solana Beach, CA
- W.L. Gore & Associates, Inc.; Elkton, MD

High-Rate Disinfection - Induction Mixers
- The Mastrrr Company; Friendswood, TX
- USFilter/Stranco Products; Bradley, IL

High-Volume Low-Pressure Spray Guns
- ANEST IWATA Corporation; Yokohama, Japan
- ITW Automotive Refinishing; Maumee, OH (2)
- ITW Industrial Finishing, Binks-DeVilbiss; Maumee, OH
- Sharpe Manufacturing Co.; Santa Fe Springs, CA

Immunoassay Test Kits
- EnviroLogix, Inc.; Portland, ME
- Hach Company; Loveland, CO
- Hybrizyme; Raleigh, NC
- Strategic Diagnostics, Inc.; Newark, DE (3)

Immunosensors
- Research International, Inc.; Woodinville, WA
- Texas Instruments; Dallas, TX

In-Drain Treatment Technologies
- Hydro Compliance Management, Inc.; Ann Arbor, MI

Infrared Monitors (Field Portable)
- Innova AirTech Instruments; Naerum, Denmark

Innovative Liquid Coatings
- Evermore Paints and Coatings, Inc.; Tulsa, OK

Ion Mobility Spectrometers
- Barringer Instruments, Inc.; Warren, NJ

241 Verified Technologies

Ion Selective Electrodes
- Dexsil Corporation; Hamden, CT (2)

Laser Induced Fluorescence Sensors
- Fugro Geosciences, Inc.; Houston, TX
- U.S. Navy, Naval Command, Control, and Ocean Surveillance Center, Research, Development, Test and Evaluation Division; San Diego, CA

Laser Targeted Paint Application
- Laser Touch and Technologies, LLC; Waterloo, IA

Lead in Dust Detection Technologies
- KeyMaster Technologies; Kennewick, WA
- Monitoring Technologies International; Perth, Western Australia
- NITON Corporation; Billerica, MA (3)
- Palintest; Erlanger, KY

Mercury Amalgam Separation
- Dental Recycling North America, Inc.; New York, NY

Mercury Continuous Emission Monitors
- Envimetrics; Pluckemin, NJ
- Nippon Instruments Corporation; Osaka, Japan (4)
- Lumex, Ltd.; Cleveland, OH
- Opsis AB; Furuland, Sweden
- PS Analytical, Ltd.; Kent, England (2)

Metal Finishing Energy Conservation
- KCH Services, Inc.; Forest City, NC

Metal Finishing Sludge Reduction
- Davis Technologies International Corp.; Harrisonburg, VA
- Kaspar Electroplating Company; Shiner, TX

Metal Finishing Water Use Reduction Recycling
- Hadwaco US, Inc.; Atlanta, GA
- Hydrometrics, Inc.; Helena, MT
- Lobo Liquids, Inc.; Houston, TX
- The MART Corporation; Maryland Heights, MO

Microturbines and Microturbine Combined Heat and Power Systems
- Capstone Microturbine Corporation; Chatsworth, CA
- Honeywell Power Systems, Inc.; Albuquerque, NM (2)
- Ingersoll-Rand Energy Systems; Portsmouth, NH
- Mariah Energy Corporation; Alberta, Canada

Mobile Sources Devices
- Donaldson; Minneapolis, MN (3)

Monitoring Systems
- ANR Pipeline Company; Detroit, MI

Multi-Metal Continuous Emission Monitors
- Cooper Environmental Services; Portland, OR

Multi-Parameter Water Quality Probes
- General Oceanics, Inc.; Miami, FL
- YSI Incorporated; Yellow Springs, OH

Natural Gas Compressor Leak Mitigation
- A&A Environmental Seals, Inc.; La Marque, TX (2)
- C. Lee Cook Division, Dover Corporation; Louisville, KY (2)
- France Compressor Products; Newton, PA

Natural Gas Dehydration
- Engineered Concepts, LLC; Farmington, NM

NO/NO_x Portable Analyzers
- Bacharach, Inc.; Pittsburgh, PA
- COSA Instruments Corporation; Norwood, NJ
- ECOM America, Ltd.; Norcross, GA
- Energy Efficiency Systems, Inc.; Westbury, NY
- Horiba Instruments, Inc.; Irvine, CA
- Land Combustion; Newtown, PA
- Testo, Inc.; Flanders, NJ
- TSI, Inc.; St. Paul, MN

On-Board Emissions Monitors
- Clean Air Technologies International, Inc.; Buffalo, NY

Optical Open-Path Monitors
- AIL Systems, Inc.; Deer Park, NY
- Boreal Laser; Alberta, Canada
- Opsis, Inc.; San Marcos, CA
- Spectrex, Inc.; Cedar Grove, NJ (2)
- UNISEARCH Associates, Inc.; Ontario, Canada

Portable Cyanide Analyzers
- CHEMetrics, Inc.; Calverton, VA
- LaMotte Company; Chesterton, MD
- Orbeco-Hellige; Farmingdale, NY
- Thermo Orion; Beverly, MA (2)
- WTW Measurement Systems; Ft. Myers, FL

Portable Multigas Emissions Analyzers
- Testo, Inc.; Flanders, NJ

Portable Water Analyzers/Test Kits
- Nitrate Elimination Co., Inc.; Lake Linden, MI

Pressure Relief Valves
- The Protectoseal Company; Bensenville, IL

Rechargeable Alkaline Batteries
- Rayovac Corporation; Madison, WI

Refrigerant Leak Monitoring Devices
- KMC Controls, Inc.; New Paris, IN

Residential Nutrient Reduction
- Aquapoint, Inc.; New Bedford, MA
- Bio-Microbics; Shawnee, KS
- F.R. Mahony & Associates, Inc.; Rockland, MA
- SeptiTech, Inc.; Gray, ME
- Waterloo Biofilter Systems, Inc.; Ontario, Canada

Sediment Sampling Technologies
- Aquatic Research Instruments; Lemhi, ID
- Art's Manufacturing & Supply, Inc.; American Falls, ID

Soil/Soil Gas Sampling Technologies
- Art's Manufacturing & Supply, Inc.; American Falls, ID
- Beacon Environmental Services, Inc. (formerly Quadrel Services, Inc.); Clarksburg, MD
- Clements & Associates, Inc.; Newton, IA
- Geoprobe Systems, Inc.; Salina, KS
- SimulProbe Technologies, Inc.; Novato, CA
- W.L. Gore & Associates, Inc.; Elkton, MD

Turbidimeters
- ABB Instrumentation; Lombard, IL
- Endress+Hauser Conducta GmbH+Company; Gerlingen, Germany (Greenwood, IN)
- Monitek Technologies, Inc.; Livermore, CA
- Sigrist-Photometer AG; Ennetburgen, Switzerland

UV Curable Coatings
- Allied PhotoChemical; Marysville, MI

UV Disinfection - Secondary Effluent/ Wastewater Reuse
- Aquionics, Inc.; Erlanger, KY
- Ondeo Degremont, Inc.; Richmond, VA
- SUNTEC *environmental*, Inc.; Ontario, Canada

Vapor Recovery Systems Technologies
- COMM Engineering, USA; Lafayette, LA

Vegetable Oil Transformer Fluids
- ABB, Inc.; South Boston, VA
- Cooper Power Systems, Inc.; Waukesha, WI

Vehicle Axle Lubrication
- ConocoPhillips; Ponca City, OK

X-Ray Fluorescence Analyzers (Field Portable)
- Key Master (formerly Scitec Corporation, Inc.); Mahwah, NJ
- HNU Systems, Inc.; Newton Highlands, MA
- Metorex, Inc.; Princeton, NJ (2)
- Niton Corporation; Bedford, MA
- Kevex Spectrace Instruments (formerly Spectrace Instruments, TN Spectrace); Sunnyvale, CA (2)

Erosion Control Technologies - EvTEC
- Carpenter Erosion Control; Ankeny, IA

Wastewater Treatment Technologies - EvTEC
- ThermoEnergy Corporation; Little Rock, AR

Indoor Air - Commercial Furniture
- Test Protocol Verification

Indoor Air - Ventilation Air Filters
- Test Protocol Verification

Note: The total number of ETV verifications includes 12 Paint Overspray Arrestors and 9 additional Baghouse Filtration Products verified by the ETV Air Pollution Control Technology Center. The verification reports and statements for the 12 Paint Overspray Arrestors were valid 12 months from the date of verification and have expired. The verification reports and statements for the nine Baghouse Filtration Products were valid for three years from the date of verification and have also expired.

ETV Technology Field Day Demonstrates Instruments for Homeland Security

The ETV Program and Battelle are conducting performance verification of technologies that can monitor, detect, and decontaminate biological and chemical contaminants in drinking water, buildings, and other structures. On October 20, 2003, EPA and Battelle hosted a technology field day to demonstrate three types of instruments being verified for homeland security applications.

The three types of technologies discussed at the technology field day were: *rapid toxicity monitors* for monitoring and protecting the quality of the Nation's drinking water supplies; *portable ion mobility spectrometers* for monitoring and detecting chemical agents in buildings and public places; and *hydrogen peroxide decontamination* for decontaminating indoor surfaces in buildings and other structures contaminated with biological agents.

The field day was held at the Battelle headquarters in Columbus, OH, and featured speakers from both the U.S. EPA and Battelle. Paul Gilman, U.S. EPA Science Advisor and Assistant Administrator for Research and Development, E. Timothy Oppelt, Director of the EPA National Homeland Security Research Center, and Charles Wilhelm, Vice President and Director of Battelle's Office of Homeland Security, were speakers. Battelle staff members provided demonstrations of each of the three types of homeland security technologies.

The event was well-attended by state and local officials, the scientific community, the media, and several elected officials, most notably Senator George V. Voinovich, R-OH, and Congressman Patrick J. Tiberi, R-12-OH, who also addressed the attendees, along with a representative from the office of Senator Mike DeWine, R-OH. Comments from the attendees were very positive and the event received significant coverage in the Ohio media.

Ryan James, Battelle, demonstrates a rapid toxicity monitor undergoing verification by the ETV Advanced Monitoring Systems Center

ETV Centers Verify a Total of 241 Technologies

The ETV Program recently completed technology verifications for 38 innovative environmental technologies, increasing the total number of technologies verified by the program to 241! The verifications are summarized below.

The **Air Pollution Control Technology Center**, in cooperation with Research Triangle Institute, has verified the performance of three emissions control systems for mobile diesel engine air pollution control. The three systems were developed by Donaldson Company, Inc., and are: Series 6100 Diesel Oxidation Catalyst Muffler and Spiracle Closed Crankcase Filtration System; Series 6100 Diesel Oxidation Catalyst Muffler; and Series 6000 Diesel Oxidation Catalyst Muffler and Spiracle Closed Crankcase Filtration System. The test verified the emission reduction achieved by a technology for particulate matter (PM), nitrogen oxides (NO_X), hydrocarbons (HC), and carbon monoxide (CO) relative to the performance of the same baseline engine without the system in place.

The **Drinking Water Systems Center**, operated by NSF International, has verified the performance of:

- Polymem UF120 S2 Ultrafiltration Membrane Module. The Polymem UF120 S2 Ultrafiltration Module is comprised of 19 individual polysulfone hollow-fiber membrane bundles housed in a PVC pressure vessel. Verification testing was conducted over a 46-day period at the Green Bay Water Utility Filtration Plant in Luxemburg, WI. The feed water was from Lake Michigan and testing was conducted during winter/spring conditions when, historically, feed water quality is most difficult to treat.

- US Filter 3M10C Microfiltration (MF) Membrane System. The 3M10C package plant contains three pressure vessels with one membrane module per pressure vessel. Verification testing was conducted

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Web Watch

ETV The ETV Program Homeland Security Fact Sheet is available at http://www.epa.gov/etv/pdfs/fs/03_fs_hs.pdf.

ETV The ETV Advanced Monitoring Systems Center monthly newsletter *The Monitor* is available at http://www.epa.gov/etv/sitedocs/monitor.html.

ETV Issue 8 (April 2003) of the *Greenhouse Gas Technology News* is available at http://www.epa.gov/etv/sitedocs/ghgnewletter.html.

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over a 44-day test period at the Aqua 2000 Research Center in Chula Vista, CA. The source water was a blend of Colorado River and State Project Water, two of the major raw drinking water supplies in Southern California. Verification testing was conducted at manufacturer-specified operating conditions.

The **Greenhouse Gas Technology Center**, operated by Southern Research Institute, has verified the performance of:

- Ingersoll-Rand Energy Systems, IR Power Works 70 kW Microturbine System for distributed electrical power and heat generation. Verification of the IR Power Works system was conducted at the Crouse Community Center in Morrisville, NY, in collaboration with the New York State Energy Research and Development Authority (NYSERDA). The system was tested for three classes of verification parameters: heat and power production performance; emissions performance (NO_X, CO, THC, CO_2, and CH_4); and power quality performance.

- Capstone 60 MicroTurbine System by CDH Energy Corporation. The primary components of this combined heat and power system are a Capstone 60 MicroTurbine and a Unifin International heat exchanger. This technology was verified in collaboration with NYSERDA and the verification test was conducted at a supermarket in Hauppage, NY. The system was tested for three classes of verification parameters: heat and power production performance; emissions performance (NO_X, CO, THC, CO_2, and CH_4); and power quality performance.

- Engineered Concepts, LLC, Quantum Leap Dehydrator (QLD) for emission control of criteria pollutants, hazardous pollutants, and greenhouse gases. Testing was conducted at the Kerr-McGee Gathering Station in Brighton, CO. The QLD was evaluated for both operational performance (sales gas moisture content, sales gas production rate, glycol circulation rate, and makeup natural gas flow rate) and environmental performance (reboiler stack emission rates, HAP destruction efficiency, and wastewater and condensate production rate).

- ConocoPhillips Fuel-Efficient High-Performance (FEHP) SAE 75W90 Rear Axle Gear Lubricant. This product is marketed as a fuel-efficient, high-performance, multi-grade gear lubricant for light-duty trucks, automobiles, and sport utility vehicles. The goal of this performance test was the determination of a change in fuel economy resulting from the use of the FEHP lubricant when compared to a standard or reference lubricant. Emissions of greenhouse gases and other pollutants were also determined.

- Plug Power Stationary Unit 1 (SU1) Fuel Cell System, one of the first commercially available proton exchange membrane (PEM) fuel cell systems. This fuel cell is designed for distributed electrical power generation. The verification test was conducted in partnership with NYSERDA at a private residence in Lewiston, NY. The system was evaluated for three classes of verification parameters: power production performance, emissions performance, and power quality performance.

The **Advanced Monitoring Systems Center**, in cooperation with Battelle, has verified the performance of:

- REMOTE (Real-world Emissions Monitoring On-board Testing Equipment) On-board Emissions Monitor (OEM) developed by Clean Air Technologies International, Inc. This monitor is designed to measure exhaust emissions from electronically controlled light-duty passenger vehicles and light trucks of model year 1996 and newer with on-board diagnostics (OBD) ports. The verification was based on evaluating the performance of the REMOTE OEM under realistic operating conditions. The monitor was evaluated for the following parameters: precision, overall accuracy (bias and precision), reliability and ease of use.

- Five portable analyzers for arsenic in water. The five analyzers are: Quick Low Range, Quick Low Range II, Quick Ultra Low II, and Quick II, all by Industrial Test Systems, Inc., and PDV 6000 with VAS Version 2.1 Software by Monitoring Technologies International, Pty. Ltd. The four Industrial Test Systems Quick test kits are portable, rapid devices designed for on-site analysis of arsenic in water. The PDV 6000 is a portable analyzer designed for the on-site rapid analysis of heavy metal ions and, for this test, was used to measure arsenic in water. The analyzers were verified in terms of performance on the following parameters: accuracy, precision, linearity, method detection limit, matrix interference effects, operator bias, inter-unit reproducibility, and rate of false positives/false negatives.

- Five continuous emission monitors (CEMs) to measure mercury emissions. The five monitors are: Sir Galahad II by PS Analytical, Ltd.; Argus-Hg 1000 by Envimetrics; DM-6D/DM-6P and MS-1/DM-5 both by Nippon Instruments Corporation; and Hg-200 by Opsis AB. The purpose of this verification test was to evaluate the performance of the monitors at a full-scale field location, over a substantial duration of continuous operation. The CEMs were challenged by stack gases

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generated from the thermal treatment of a variety of actual wastes in the Toxic Substances Control Act Incinerator at the East Tennessee Technology Park in Oak Ridge, TN.

Site Characterization and Monitoring Technologies, in cooperation with Sandia National Laboratories and Oak Ridge National Laboratory, has completed performance verification of:

- Two ground-water sampling technologies for deployment in narrow-bore, direct-push wells at contaminated sites with potential ground-water contamination. The Model MB470 Mechanical Bladder Pump and the GW1400 Series Pneumatic Bladder Pump, both offered by Geoprobe Systems, Inc., were tested at the U.S. Geological Survey Hydrological Instrumentation Facility at the NASA Stennis Space Center and the Tyndall Air Force Base. Each technology was independently evaluated to assess its performance in the collection of inorganic cations commonly encountered in ground-water, as well as volatile organic compound (VOC) contaminated ground-water.

- Lead in dust wipe measurement technology, the XLt 700 Series X-Ray Fluorescence Spectrum Analyzer developed by NITON LLC. The verification test was conducted at the U.S. EPA Region 1 laboratories in North Chelmsford, MA. The following performance characteristics of the XLt 700 analyzer were evaluated: precision, accuracy, comparability, detectable blanks, false positive and false negative results, completeness, sample throughput, and overall evaluation.

The **Water Quality Protection Center**, operated in cooperation with NSF International, has verified the performance of:

- Five on-site residential nutrient reduction systems. The five systems are: Bioclere Model 16/12 by Aquapoint, Inc.; Waterloo Biofilter Model 4-Bedroom by Waterloo Biofilter Systems, Inc.; SeptiTech Model 400 System by SeptiTech, Inc.; Amphidrome Model Single Family System by F.R. Mahony & Associates; and RetroFAST 0.375 System by Bio-Microbics.

- Triton Systems, LLC, Solid Bowl Centrifuge Model TS-5000. The Model TS-5000 was tested for its ability to concentrate solids, nitrogen, phosphorous, potassium, copper, zinc, and chloride in a flushed swine waste. The verification test was conducted by North Carolina State University's Biological and Agricultural Engineering Department in Raleigh, NC.

- Three ultraviolet (UV) disinfection systems for treatment of secondary wastewater effluent. The three systems are: LPX200 UV Disinfection System by SUNTEC *environmental*, Inc.; Aquaray 40 HO VLS Disinfection Systems by Ondeo Degremont, Inc.; and bersonInLine 4250 UV System by Aquionics, Inc. The verification tests were conducted at the Parsippany-Troy Hills Wastewater Treatment Plant in Parsippany, NJ. The systems were evaluated in terms of verification performance on the following: power consumption and headloss, dose-response calibration curves, demonstration of the effective delivered dose, and scalability.

- Hydro-Kleen Filtration System developed by Hydro Compliance Management, Inc. The Hydro Kleen system was tested in a specifically designed testing rig to simulate a catch basin receiving surface runoff. The system was challenged by a variety of hydraulic flow and contaminant load conditions to evaluate the system's performance under normal and elevated loadings. Additional tests determined the media's hydrocarbon capacity at continuous flow and the system's performance at reduced suspended solids loading.

The **Pollution Prevention (P2) Coatings and Coating Equipment Pilot**, in cooperation with Concurrent Technologies Corporation, has verified the performance of:

- Evermore Paints and Coatings, Inc., Formula 5 Coating. This innovative liquid coating was tested for industrial, architectural, and institutional applications. The verification test was designed to verify the environmental benefits and performance characteristics of the Formula 5 coating.

- KrohnZone 7014 developed by Allied PhotoChemical. This liquid coating is UV-curable and is intended for automotive manufacturing applications. The test was designed to verify the environmental benefits of the UV-curable coating by determining the total volatile content using ASTM D 5403. The test also verified the coating's finish quality characteristics.

- LPH400-LV developed by ANEST IWATA Corporation, a high-volume low-pressure (HVLP) liquid paint spray gun for applications in the automotive refinishing industry. The test was conducted under representative factory conditions, and was designed to verify the environmental benefits of the HVLP spray gun with specific quality requirements for the resulting finish.

The **Pollution Prevention (P2) Metal Finishing Technologies Pilot**, operated by Concurrent Technologies

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ETV Calendar

Date	Location	Event
November 2-6	Philadelphia, PA	ETV Advanced Monitoring Systems Center, ETV Drinking Water Systems Center, and ETV Program — Presenting and exhibiting at the American Water Works Association Water Quality Technology Conference and Exposition
November 6	Washington, DC	ETV Greenhouse Gas Technology Center Advanced Energy Stakeholders Meeting
November 7	Teleconference	ETV Pollution Prevention (P2) Coatings and Coating Equipment Pilot Stakeholders Meeting
November 9-13	Austin, TX	ETV Advanced Monitoring Systems Center and ETV Program — Presenting and exhibiting at the SETAC 24th Annual Meeting in North America
November 16-19	Chicago, IL	ETV Program — ETV exhibit at the Water Environmental Federation TMDL 2003 Conference
November 17-19	Orlando, FL	ETV Program — ETV exhibit at the Emergency Management/ Homeland Security Exposition: EMEX 2003
November 20	Ann Arbor, MI	ETV Drinking Water Systems Center Annual Stakeholder Meeting
December 2-4	Washington, DC	ETV Program — ETV exhibit at the 2003 SERDP/ESTCP Technical Symposium and Workshop
December 8-11	Scottsdale, AZ	ETV Pollution Prevention (P2) Coatings and Coating Equipment Pilot — Presenting and exhibit at the 14th Annual International Workshop on Alternatives to Toxic Materials in Industrial Processes
January 26-29, 2004	Orlando, FL	ETV Pollution Prevention (P2) Metal Finishing Pilot — Presenting at the American Electroplaters and Surface Finishers Society AESF Week 2004
January 2004	San Antonio, TX	ETV Advanced Monitoring Systems Center Water Stakeholder Meeting [dates TBD]

For more details on ETV events, check out our online calendar at http://www.epa.gov/etv/calendar/current.html.

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Corporation, has verified the performance of the Industrial Wastewater Treatment Plant (IWTP) developed by Davis Technologies International Corporation. This system was tested, under actual production conditions, processing metalworking and metal finishing wastewater, at Federal-Mogul, Inc., in Blacksburg, VA. The verification test evaluated the ability of the IWTP system to remove regulated contaminants from the wastewater.

The verification reports and statements for all of these technologies are available on the ETV Web Site at http://www.epa.gov/etv/verifications/verification-index.html.

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